PATENT ABSTRACTS OF JAPAN

(11)Publication number : 11-283210
(43)Date of publication of application : 15.10.1999

(51)Int.Cl. G11B 5/187
G11B 5/127

(21)Application number : 10-086137
(22)Date of filing : 31.03.1998

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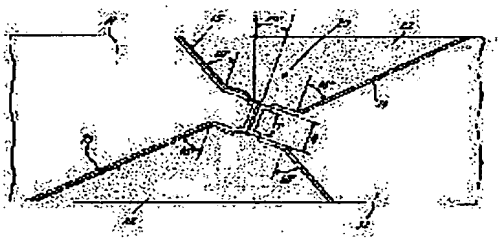
(54) MAGNETIC HEAD AND ITS MANUFACTURE

(57)Abstract:
PROBLEM TO BE SOLVED: To precisely form a magnetic head part even when a track width is narrow by making the track width of a central part of a magnetic gap part of a side opposite to a recording medium narrower than a gap width.
SOLUTION: The central part of a front gap part 20 is provided with the track width T, and is tilted as it goes toward the outside to be widened until becoming the gap width G. Core half bodies 11, 12 are tilted as they go toward the outside from the front gap part 20. Control parts 22 made or glass controlling the gap width G of the front gap part 20 are provided on both sides of the front gap part 20. For preventing the control parts 22 from peeling from the magnetic head, the control part 22 is constituted so that an angle between the direction of the tilt getting toward the outside from the front gap part 20 and one side surface of the magnetic head is enlarged so as not to form a narrow area, and not to form a thin layer. The track width T is decided by photolithography, and the wide gap width G is decided by machining.



LEGAL STATUS

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[Date of sending the examiner's decision of rejection]

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CLAIMS

[Claim(s)]
[Claim 1] By forming the metal magnetic layer (13) of a pair, and (14) in the matching section of the core half object (11) of a pair which consists of a magnetic material, and (12) on both sides of a non-magnetic layer (15) Magnetic-head **** which formed the magnetic gap section (20) and (21), and formed the nonmagnetic specification part (22) which regulates gap width of face on both sides of this magnetic gap section (20) and (21), The center section of a record medium and the magnetic gap section (20) of the side which counters is the magnetic head characterized by being the width of recording track narrower than gap width of face.
[Claim 2] A record medium and the magnetic gap section (20) of the side which counters are the magnetic head according to claim 1 which has spread until it inclines as it goes outside from a center section, and it becomes the gap width of face G.
[Claim 3] The magnetic head according to claim 2 formed so that the inclined plane outside towards may become un-parallel to the direction of the azimuth angle of an adjoining truck from a center section.
[Claim 4] A core half object (11) and (12) are the magnetic head given in any of claim 1 thru/or claim 3 formed so that the inclined plane may not be parallel in the direction of the azimuth angle of an adjoining truck by inclining as it goes outside from the magnetic gap section (20) and (21) and the include angle with the side face of the magnetic head to make may become large they are.
[Claim 5] The core half object (11) of a pair and (12) are the magnetic head given in any of claim 1 thru/or claim 4 in which the matching section is formed with the single crystal ingredient (71) at least they are.
[Claim 6] By forming the metal magnetic layer (13) of a pair, and (14) in the matching section of the core half object (11) of a pair which consists of a magnetic material, and (12) on both sides of a non-magnetic layer (15) In the manufacture approach of the magnetic head which formed the magnetic gap section (20) and (21), and formed the nonmagnetic specification part (22) which regulates gap width of face on both sides of this magnetic gap (20) and (21) On the 1st process which forms the pattern (47) which has the width of recording track by the photolithography on the wafer (40) used as said core half object (20) and (21), and a wafer (40), by machining The manufacture approach of the magnetic head characterized by including the 3rd process which forms the metal magnetic thin film (60) used as said metal magnetic layer on the 2nd process which prepares the regulation slot (50) regulated to gap width of face larger than the width of recording track, and a wafer (40).
[Claim 7] The 1st process by making a wafer (40) incline, and rotating it and etching by the ion beam The etching process in which the side face of a pattern (47) in which it has the width of recording track is formed by inclining is included. An etching process Where a resist layer (41) and (42) are arranged on a wafer (40) The manufacture approach including the process which etches by the ion beam, and the process which etches again by the ion beam where a resist layer (41) and (42) are removed of the magnetic head according to claim 6.
[Claim 8] An etching process is the manufacture approach of the magnetic head according to claim 7 formed so that the inclined plane of the pattern (47) which has the width of recording track may become un-parallel to the direction of the azimuth angle of an adjoining truck.
[Claim 9] The regulation slot (50) formed at the 2nd process is the manufacture approach of the magnetic head given in any of claim 6 thru/or claim 8 formed so that the include angle with the side face of the magnetic head which the inclined plane is not parallel in the direction of the azimuth angle of an adjoining truck by inclining as it goes to a pars basilaris ossis occipitalis, and being narrow, and is formed to make may become large they are.
[Claim 10] The wafer (40) used as a core half object is the manufacture approach of the magnetic head given in any of claim 6 thru/or claim 9 in which the upper part is formed with the single crystal ingredient (74) at least they are.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the magnetic head used for magnetic recorder and reproducing devices, such as VTR (video tape recorder), and its manufacture approach. Especially this invention relates to the suitable magnetic head for high density record playback and its manufacture approaches, such as DVC (digital camcorder) and DAT (digital audio tape recorder).
[0002]
[Description of the Prior Art] In said DVC, DAT, etc., it is high-density, and in order to perform record playback, the high metal tape of coercive force is used. In this case, in order to prevent the magnetic saturation in a ferrite, as shown in drawing 15 and drawing 16 , the matching section of the core half object (91) of a pair and (92) pinches a non-magnetic layer (95). A Fe-aluminum-Si system polycrystal alloy, a Fe-Ta-N system fine crystal grain alloy, By forming the metal magnetic layer (93) of a pair which consists of a Co-Zr system amorphous alloy etc., and (94), the magnetic gap section was formed and the glass specification part (96) which regulates gap width of face, and (97) are prepared in the both sides of the magnetic gap section. The direction which counters record media, such as a magnetic tape, among the magnetic gap sections will be called the front gap section (98), and another side will be called the back gap section. Moreover, in order to prevent the cross talk from an adjoining truck, from the cross direction of a truck, the magnetic gap section shifts an include angle a little, and is arranged, and this include angle is called the azimuth angle (99).
[0003]
[Problem(s) to be Solved by the Invention] The magnetic head used for DVC, DAT, etc. has the width of recording track very as narrow as 13-micrometer (micrometer) extent. Moreover, as for the interface of a specification part and a core half object, inclining is desirable in order to prevent the cross talk from the approaching truck. However, it is difficult to form these dimensions with the sufficient yield by machining. Moreover, by the above-mentioned specification part (96) and (97), if gap width of face of the front gap section is made still narrower so that it may become the width of recording track since the gap width of face of the front gap section and the gap width of face of the back gap section are formed equally, the gap width of face of the back gap section will also become narrow, magnetic saturation will occur in the back gap section, and the engine performance of the magnetic head will fall.
[0004]
[Objects of the Invention] This invention aims at offering the manufacture approach of the magnetic head which can form the magnetic gap section with a sufficient precision, even if the width of recording track is narrow.
[0005]
[Means for Solving the Problem] The center section of magnetic-head **** which the magnetic head of this invention formed the magnetic gap by forming the metal magnetic layer of a pair in the matching section of the core half object of a pair which consists of a magnetic material on both sides of a non-magnetic layer, and formed the nonmagnetic specification part which regulates gap width of face on both sides of this magnetic gap in order to solve the above-mentioned technical problem, a record medium, and the magnetic gap of the side which counters is characterized by being the width of recording track narrower than gap width of face.
[0006] The manufacture approach of the magnetic head of this invention moreover, by forming the metal magnetic layer of a pair in the matching section of the core half object of a pair which consists of a magnetic material on both sides of a non-magnetic layer In the manufacture approach of the magnetic head which formed the magnetic gap and formed the nonmagnetic specification part which regulates gap width of face on both sides of this magnetic gap On the 1st process which forms the pattern which has the width of recording track by the photolithography on the wafer used as said core half object, and a wafer, by machining It is characterized by including the 3rd process which forms the metal magnetic thin film used as said metal magnetic layer on the 2nd process which prepares the regulation slot regulated to gap width of face larger than the width of recording track, and a wafer.
[0007]
[Function and Effect] In this invention, the width of recording track in a magnetic gap is determined by the photolithography, and gap width of face larger than this width of recording track is determined by machining. Therefore, even if the width of recording track is narrow, it can form with a sufficient precision. Moreover, since the back gap section has gap width of face regardless of the width of recording track, even if the width of recording track becomes narrow, it does not cause the performance degradation in the back gap section.
[0008]

[Embodiment of the Invention] Hereafter, the operation gestalt of this invention is explained.
Operation gestalt 1 drawing 1 and drawing 2 are the sectional views showing the magnetic head (10) which is the 1st operation gestalt of this invention. Said magnetic head (10) to the opposed face of the core half object (11) of the pair formed from magnetic materials, such as a Mn-Zn ferrite, and (12) A Fe-aluminum-Si system polycrystal alloy, a Fe-Ta-N system fine crystal grain alloy, Form the metal magnetic layer (13) which consists of a Co-Zr system amorphous alloy etc., and (14), and the non-magnetic layer (15) which consists of SiO2 grade is formed on the metal magnetic layer (13) of one core half object (11). It comes to compare a core half object (11) and (12), and a top face ****s to a record-medium slack magnetic tape. A magnetic gap is formed in the matching section on top and the downward matching section, and the front gap section (20) and the back gap section (21) are called in them, respectively.
[0009] As shown in drawing 2 , the front gap section (20) inclines as a center section has width-of-recording-track T and goes outside, and it spreads until it serves as the gap width of face G. A core half object (11) and (12) incline as they go outside from the front gap section (20). In order to prevent the cross talk from an adjoining truck, these inclinations are formed so that it may become un-parallel to the direction of the azimuth angle of an adjoining truck. In addition, since the concrete include angle of an inclined plane is indicated by JP,3-224110,A, for example, the detailed explanation is omitted.
[0010] The glass specification part (22) which regulates the gap width of face G of the front gap section (20) is prepared in the both sides of the front gap section (20). In addition, in order to prevent that a glass specification part (22) exfoliates from the magnetic head, as for a specification part (22), it is desirable for a field to be narrow, and it is desirable not to form a film. Therefore, it is desirable for the include angle of the direction of the inclination which goes outside from the front gap section (20) in a core half object (11) and (12), and the side face of the magnetic head to make to be large.
[0011] The coil slot (30) which carried out opening to the opposed face, and (31) are established by a core half object (11) and (12), and a slant face (32) and (33) are established by this coil slot (30) and (31) bottom. [leaning to the inner sense] Between this slant face (32) and (33), it fills up with glass (34) and a core half object (11) and (12) are joined with this glass (34).
Manufacture approach drawing 3 of the magnetic head - drawing 13 show the manufacture approach of the above-mentioned magnetic head. First, as mirror plane processing is performed to the front face of the wafer (40) which consists of a magnetic material and it is shown in drawing 3 , the field in which a resist layer (41) and (42) are formed in the front section and the back section which ask for formation of the magnetic gap section, respectively, and a resist layer (41) and (42) are not formed of ion beam machining is cut. Ion beam machining is performed by irradiating ion, making a wafer (40) incline 45 degrees and rotating, as shown in drawing 4 . At this time, an ion beam (43) rebounds in the side face of a resist layer (41) and (42), root headquarters is etched, and a flat part (44) parallel to a front face is formed. Since this flat part (44) is parallel to the inferior-surface-of-tongue section of the resist layer (41) used as the gap section, and (42), the cross talk of it will be carried out to the gap section. So, with this operation gestalt, after removing a resist layer (41) and (42), as shown in drawing 5 , ion beam machining is again given to a wafer (40). Thereby, the rebound phenomenon of the ion by the resist layer (41) and (42) is lost, and as shown in drawing 6 and drawing 7 , a fixed inclined plane (45) and (46) are obtained. In addition, the include angle which this inclined plane (45) and (46) make can be changed by the irradiation time of an ion beam etc.
[0012] Next, by cutting by machining along with the alternate long and short dash line shown in drawing 7 , as shown in drawing 8 , the regulation slot (50) which regulates gap width of face is cut. At this time, as shown in drawing 9 , the width of face F of the front pattern section (51) is formed more narrowly than the width of face B of the back pattern section (52). The width of face F of the front pattern section (51) is width-of-recording-track T (refer to drawing 2 .). In the example, it corresponds to 13 micrometers, and the width of face B of the back pattern section (52) is the gap width of face G (refer to drawing 2 .). In the example, it corresponds to 17 micrometers. In the example, right-hand side is formed from a horizontal plane, and, as for the tilt angle of a regulation slot (50), left-hand side is formed in 60 degrees from a horizontal plane 45 degrees.
[0013] Next, as shown in drawing 10 and drawing 11 , a coil slot (53) and a glass insertion slot (54), and (55) are cut in the direction which intersects said regulation slot (50). Next, a metal magnetic thin film (60) is formed on a wafer (40). Moreover, SiO2 film (61) used as a non-magnetic layer is formed on a metal magnetic thin film (60) at the wafer (40a) used as the 1st core half object. In addition, in the example, a metal magnetic thin film (60) is 3 micrometers, and SiO2 film (61) is 0.2 micrometers. Next, as shown in drawing 12 and drawing 13 , junction immobilization of a wafer (40) and the (40a) is carried out by inserting the wafer (40) used as the wafer (40a) used as the 1st core half object, and the 2nd core half object matching, a glass insertion slot (54), and (55), and fusing a glass rod (64) and (65). And the magnetic head is completed by cutting along with the alternate long and short dash line shown by drawing 12 R> 2 and drawing 13 , and winding a coil around a coil slot (53).
[0014] In the magnetic head of this operation gestalt, width-of-recording-track T in a magnetic gap is determined by the photolithography, and the gap width of face G larger than this width-of-recording-track T is determined by machining. Therefore, even if width-of-recording-track T is narrow, it can form with a sufficient precision. Moreover, since the back gap section (21) has the gap width of face G regardless of width-of-recording-track T, even if width-of-recording-track T becomes narrow, it does not cause the performance degradation in the back gap section (21).
[0015] The operation gestalt 2, next the 2nd operation gestalt of this invention are explained. Compared with the 1st operation gestalt, it differs in that the matching parts of a core half object (11) and (12) consist of a single crystal ferrite (71), and the part of others of a core half object (11) and (12) consists of a polycrystalline ferrite (72), and the magnetic head (70) of this operation gestalt forms other points similarly. What is necessary is to use the upper part as

a single crystal ferrite layer (74) bordering on the part shown with an alternate long and short dash line in drawing 3 , and just to use as a wafer (40) what joined the lower part as a polycrystalline ferrite layer (75), in order to manufacture the magnetic head (70) of this operation gestalt. Since the coil part is formed of the polycrystalline ferrite while per tape is equivalent to the former, since the contact surface with a magnetic tape is formed of the single crystal ferrite, the magnetic head (70) of this operation gestalt can reduce a sliding noise peculiar to a single crystal ferrite.

[0016] Explanation of the above-mentioned operation gestalt is for explaining this invention, and it should not be understood so that invention of a publication may be limited to a claim or the range may be ****(ed). Moreover, as for each part configuration of this invention, it is needless to say for deformation various by technical within the limits given not only in the above-mentioned operation gestalt but a claim to be possible.

[Translation done.]

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the sectional view showing the 1st operation gestalt of this invention.
[Drawing 2] It is drawing which expanded the important section of the top view of the 1st operation gestalt.
[Drawing 3] It is the perspective view showing the condition of having etched into the wafer.
[Drawing 4] It is the sectional view showing a ****** process for etching to a wafer by the ion beam.
[Drawing 5] It is the sectional view showing a ****** process for etching to a wafer again by the ion beam.
[Drawing 6] It is the perspective view showing the condition of having etched into the wafer of drawing 3 again.
[Drawing 7] It is the important section enlarged drawing which carried out the cross section along with the A-A line of drawing 6 and which was seen in the direction of an arrow head.
[Drawing 8] It is the perspective view showing the condition of having cut the regulation slot to the wafer of drawing 6 .
[Drawing 9] It is the important section enlarged drawing which carried out the cross section along with the B-B line of drawing 8 and which was seen in the direction of an arrow head.
[Drawing 10] It is the perspective view showing the condition of having cut the coil slot and the glass insertion slot to the wafer of drawing 8 .
[Drawing 11] It is the side elevation of drawing 10 .
[Drawing 12] It is the side elevation showing the condition of having compared two wafers and having inserted the glass rod in the glass insertion slot.
[Drawing 13] It is the front view of drawing 12 .
[Drawing 14] It is the sectional view showing the 2nd operation gestalt of this invention.
[Drawing 15] It is the perspective view showing the conventional magnetic head.
[Drawing 16] It is drawing which expanded the important section of the top view of the conventional example.
[Description of Notations]
(10) Magnetic head
(11) (12) core half object
(13) (14) metal magnetic layer
(15) Non-magnetic layer
(20) Front gap section
(22) Specification part
(40) Wafer

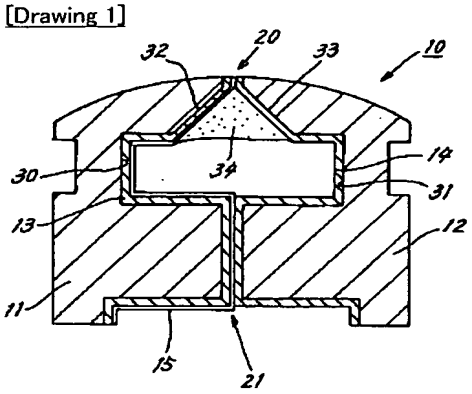
[Translation done.]

* NOTICES *

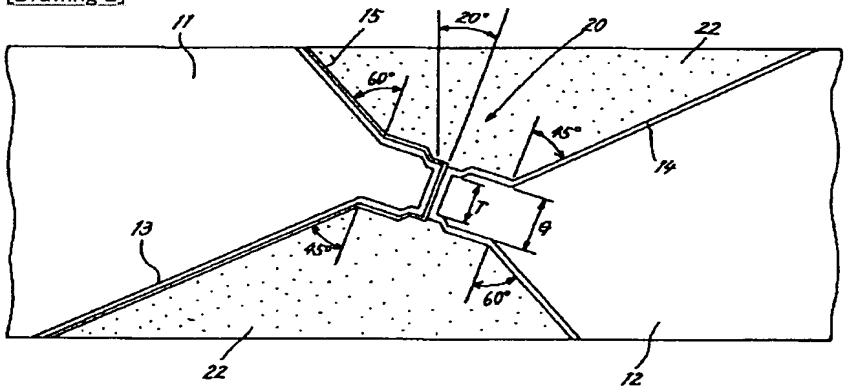
1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DRAWINGS

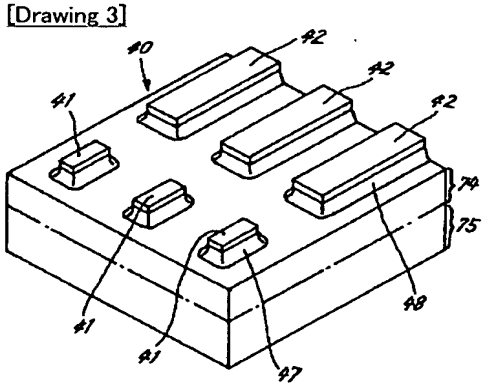
[Drawing 1]



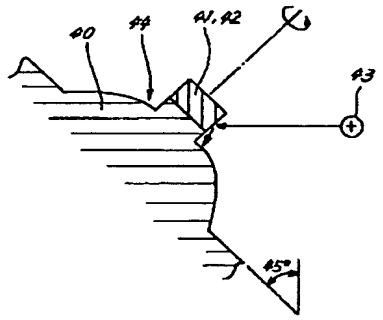
[Drawing 2]



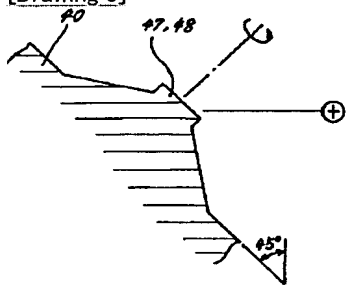
[Drawing 3]



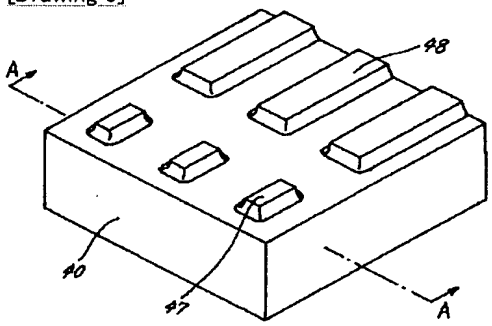
[Drawing 4]



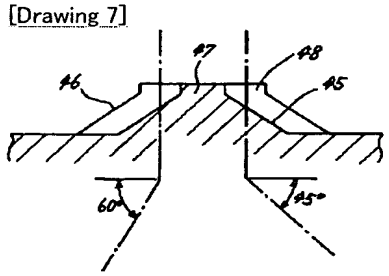
[Drawing 5]



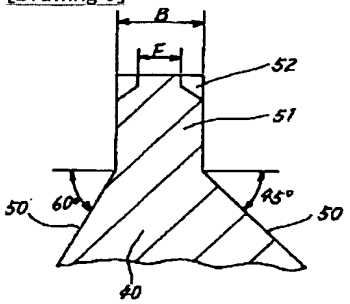
[Drawing 6]



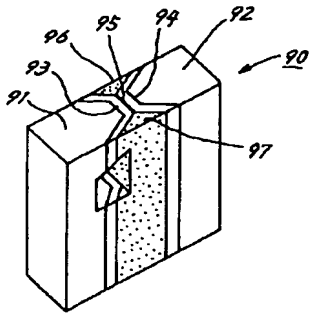
[Drawing 7]



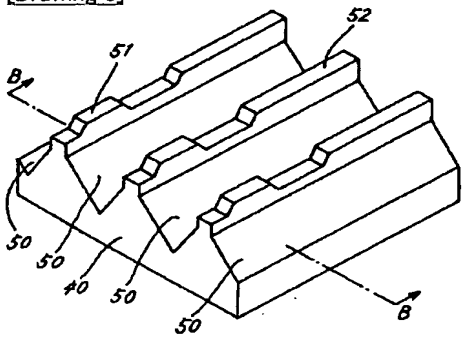
[Drawing 9]



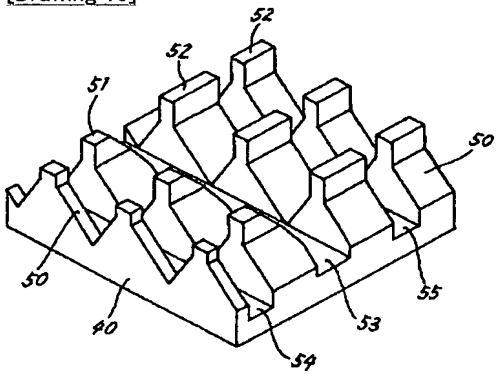
[Drawing 15]



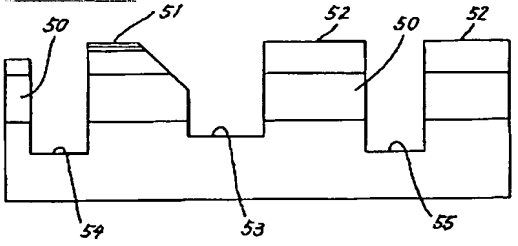
[Drawing 8]



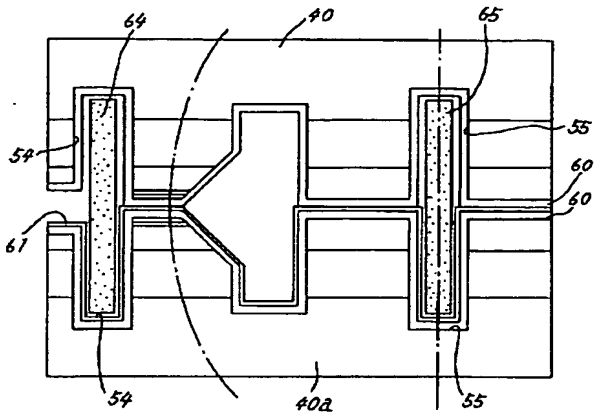
[Drawing 10]



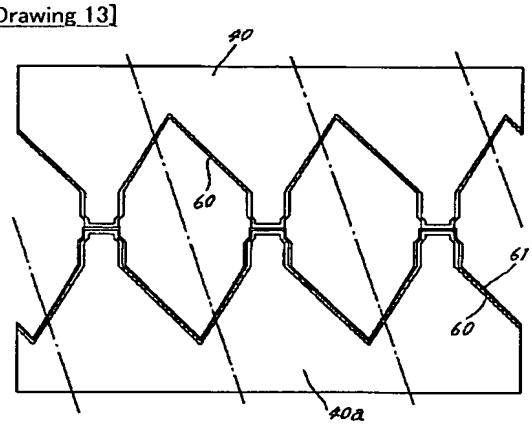
[Drawing 11]



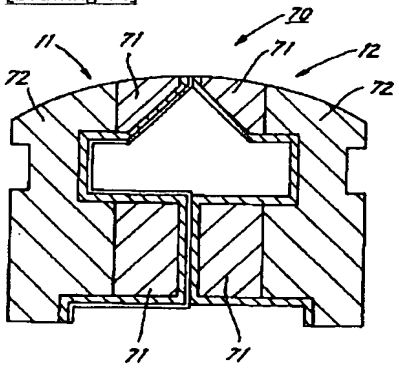
[Drawing 12]



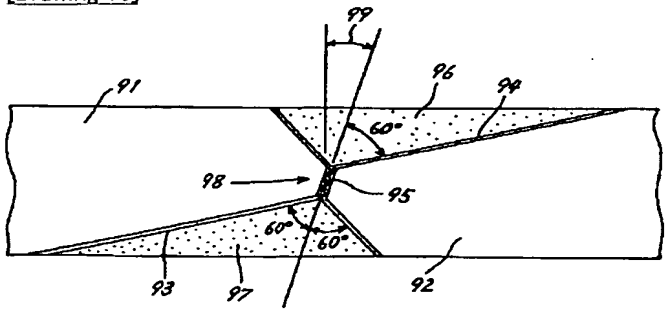
[Drawing 13]



[Drawing 14]



[Drawing 16]



[Translation done.]